

Response for Page14, Comment 1: January 6th, 2022, Monteverde Analysis



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Jarrell Properties, Inc.
c/o Mike Roberts
1005 Sophia St
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RE: Walnut Hill Subdivision – Impact to County Pump Stations

Mr. Roberts,

Per your request, this letter provides a preliminary analysis of anticipated impact to the King George County McDonald's and Main pump stations associated with the referenced project. Analysis is based upon existing pump station data provided by the King George County Service Authority (KGCSA), a proposed max density of 100 residential units (25 single family units + 75 townhomes) associated with Walnut Hill, a planned off-site development capacity of 50 single-family homes¹, and pump station max capacity and upgrade information provided by Commonwealth Engineering & Sales.

As you will recall, the KGCSA first analyzed the impact of Walnut Hill, when first contemplated as single-family housing only, in July of 2020. A memo from the authority's engineer, Draper Aden, dated July 13, 2020 based its analysis on a 300 GPD demand basis, and concluded the project would "exceed the capacity of the existing station." This assertion was made on the assumption that only one of the two existing pumps at the pump station were operating at one time (never in tandem), with a max capacity of 100 GPM. Analysis of the proposed Walnut Hill and off-site developments yielded a peak flow of 140 GPM, thus in excess of the station's stated capacity.

To evaluate the newly proposed unit mix, Monteverde worked with the KGCSA to determine a more reasonable, less conservative daily load for the smaller townhouse units. Per email from then KGCSA GM, Jonathan Weakley, dated July 7, 2021, local data reflected a 3 bedroom, 1.5 bath townhouse unit demand peaking at 167 GPD. In order to be conservative, it was

¹ As described in Exhibit B to the *Water and Sewer Extension, Expansion and Reimbursement Agreement* between KGGESA and JPI-Walnut Hill, LLC, dated 11/1/16. These 50 lots are on property adjacent to Walnut Hill and owned by third parties; they are not part of the Walnut Hill development.

suggested that an even 180 GPD per townhouse be utilized for analysis purposes, while utilizing the (also conservative) County standard of 300 GPD per single-family detached (SFD) unit. The total development could then be assumed to produce 300 GPD per each of the proposed 25 SFD units plus 180 GPD per each of the 75 TH units, for a combined total of 21,000 GPD. The assumed off-site development of 50 SFD units would be expected to produce an additional 15,000 GPD, for a grand total of 36,350 GPD added to the system.

Following these determinations, Draper Aden produced a subsequent technical memo of analysis, dated July 28, 2021. The Draper Aden Memo included recent flow data from the existing pump station, as well as current information about the pump station pumps, including confirmed max flowrate (per single pump), total head, wet well, etc. The memo concluded that the total proposed network, including existing, new on-site, and new off-site densities stated, would have a peak flow demand of 165 GPM at the McDonald's pump station. Note that peak flow demand is based upon a peaking factor of 2.5, which is consistent with Virginia SCAT regulations. The Draper Aden Memo indicated that through a conversation with Commonwealth Engineering & Sales, pump station upgrades necessary to carry this additional load would likely consist of new 5 HP pumps, starters, impellers, and breakers.

One aspect of note in these analyses provided by the County's engineer, Draper Aden, is that they did not discern or elaborate on capacities of the station when the two pumps operate in tandem. As it is known, through data provided in the 2021 Draper Aden Memo, that the two pumps do run in tandem presently, on occasion, this is an important factor to consider. In follow up with Steve Staton at Commonwealth Engineering & Sales, it was revealed that the existing pumps (without upgrades) could produce a combined 120 GPM when operating in tandem.

As this yield is below the required peak flow of 165 GPM, some form of upgrade would indeed appear warranted. In discussions of options, Mr. Staton indicated that the impellers could be swapped out to a max trim of 10-1/8" on the existing 900 RPM motors to obtain 155 GPM from a single pump. Mr. Staton indicated that the two pumps operating in tandem could be expected to handle the 165 GPM without issue. Upgrading the impellers on the existing 2HP, 900 RPM motors was estimated to cost \$2,956.00, including parts and labor.

Downstream of the McDonald's pump station lies the County's Main pump station. The Main station presently experiences an average daily load of 79,174 GPD, according to emails with KGCSA Superintendent of Operations, Dean Hoagland. Following inclusion of the proposed project and accounted-for off-site development (as described above), this total average daily load can be anticipated to increase to 114,874 GPD. Utilizing a peaking factor of 2.5 yields a



peak flow of 199.4 GPM. In discussions with the station's pump manufacturer, Smith & Loveless, the main pump station's pumps are currently rated individually at 180 GPM, with an approximate capacity of 200 GPM when pumping in tandem during peak flows. As the anticipated peak loading is very close to the station's total max capacity, some upgrades should be considered. Upgrading the system from its current 8 7/8" impellers to 10 1/8" trim could increase the capacity, without switching out pumps, to 250+ GPM when pumping individually, and 275+ GPM when pumping in tandem. Cost of making this upgrade is anticipated to be approximately \$12,000.

In sum, the proposed rezoning to allow for up to 100 residential units can be expected to necessitate relatively minor improvements to both the McDonald's pump station and the Main pump station, as outlined above.

It is my hope that this memorandum adequately describes the impact of the proposed development on the existing pressure sanitary system, and the improvements that are recommended to mitigate such impacts in full. Should you have any questions to this regard, though, please contact me at your convenience.

Sincerely



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Managing Partner

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